

HAITI PRODUCTIVE LAND USE SYSTEMS PROJECT

USAID/Haiti Economic Growth Office

SOUTH EAST CONSORTIUM FOR INTERNATIONAL DEVELOPMENT AND AUBURN UNIVERSITY

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EXECUTIVE SUMMARY

CACAO YIELD IMPROVEMENT PROGRAM

The Cacao Yield Improvement Program began last semester with the identification of cacao gardens to be used as demonstration plots. This semester Cacao Production Specialist Chris Stevenson made two additional visits to Haiti to supervise work in the demonstration plots. The focus was on correct pruning and shade adjustment, techniques which are expected to increase production by 20-30%. Grafting techniques were also introduced. CARE and PADF will collect harvest data to determine the effectiveness of the intervention.

SERVICOOP

ServiCoop cacao marketing continued its strong growth this semester, due to the establishment of a purchasing center at Dame Marie. The purchasing center, financed by USAID, allowed ServiCoop to more than triple its weekly purchases from the Grande Anse. This increase in volume of cacao marketed meant that ServiCoop could cover its operating expenses without reducing the price offered to farmers, despite the prolonged decline of the international price of cacao.

ServiCoop is also establishing itself as a coffee exporter. It exported a third container of coffee through Europe's fair trade network, which offers a price premium to cooperatives that assist small-scale farmers receive a "fair" price for their coffee. ServiCoop also began processing coffee for three more containers to be sold through the network during the 1999-2000 harvest season.

COFFEE MARKETING

This semester SECID enlarged its coffee marketing activities beyond ServiCoop and began directly assisting farm groups. SECID activities in this domain included setting up a line of credit that provided short-term marketing loans to selected farm groups and a consultancy with Enterprise Works Worldwide (EWW) to review the farm groups' current processing and marketing activities and recommend improvements.

MANIOC MARKETING

The volume of processed manioc product marketed this semester was up almost 30% over last semester. SECID Marketing Specialist Raymond Lerebours is introducing propane-fired stoves for cooking *kasav* (flatbread) made from dried manioc meal, and nine stoves have been distributed for trial in areas around the country. During the coming semester, these stoves will increase the demand for manioc meal.

MANGO MARKETING

In 1999, the mango marketing program, led by SECID Marketing Specialist Junior Paul, reached 20 farm groups and approximately 5000 farmers. The farm-level price for mango increased by 50% where the program was introduced, in Jacmel, and by 20% in areas where it was already established. SECID and PADF personnel provided training and supervision, resulting in financial and institutional strengthening and increased confidence for the participating organizations.

MARKETING OF OTHER EXPORT CROPS

SECID has been building on its relationships with mango exporters to develop marketing programs for other export crops. For these programs, SECID collaborates with other NGOs such as PADF, CARE, and ASSET, as well as the exporters. This semester we continued our programs for igname (yam), malanga, and sour orange, and began new programs for breadfruit, pumpkin, kenep, and hot pepper. For each product, the price offered by the exporter is significantly higher than the local market price. Issues regarding quality, transportation, and so on are dealt with as they arise; each product goes through a trial stage before its marketing program is expanded.

MONITORING AND EVALUATION

SECID/Haiti Monitoring and Evaluation (M&E) accomplishments this semester are in the following two areas.

ASSET Project. SECID implemented a baseline study of household economic conditions and agricultural practices of farmers participating in ASSET Project activities. The study will be published as SECID PLUS Project report No. 50, *Etude de Base et Pré-Evaluation dans les Aires d'Interventions du Projet ASSET à Belle Fontaine*, by Frisner Pierre and J. D. Lea.

Hurricane George Reconstruction Project (HGRP). USAID awarded SECID a two-year, \$449,933 contract to assist USAID design and implement a monitoring and evaluation program for the HGRP. We expect implementation will get underway next semester; however, SECID continued throughout the semester to provide

consultation to USAID on HGR design. SECID's actions this semester were based on the knowledge that some of the most important work of a M&E activity takes place before implementation starts, when activity objectives and goals are studied and refined into performance indicators and measurement systems are designed.

Additional HGRP-related activity included a technical reconnaissance by SECID/Auburn soil experts. Their findings are described in SECID/Auburn PLUS Report No. 47, *Technical Assessment of the Irrigation Systems of Marigot and Jacmel and Preliminary Observations on the Marigot Watershed*, Kyung H. Yoo and Dennis Shannon.

PROGRAM ADMINISTRATION

SECID/PLUS Project Contract Extension. Upon request from USAID, SECID developed a budget and plan of work for a one-year extension of the SECID/PLUS contract. In August, 1999, USAID accepted the proposal and through an amendment to the SECID/PLUS contract extended the contract completion date to December 31, 2000 and added \$1,056,605 to the contract funding level.

Personnel. SECID renewed short-term contracts with 8 Marketing Supervisors who have been assisting SECID Marketing Specialists, Junior Paul and Raymond Lerebours, implement marketing activities with farm groups. The marketing agents assist farm groups run surveys among their members to determine marketable quantities of desired products and assist the groups assemble crops for sale to buyers. SECID also renewed its contract with Sarah K. Belfort, SECID/Auburn Program Assistant.

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INTRODUCTION

SECID/Auburn University is under contract with USAID to provide technical assistance in agribusiness (marketing) and project monitoring and evaluation (M&E). SECID/Auburn provides these services to USAID/Haiti and to USAID contractors and grantees, such as CARE, IICA, IRD, PADF, and Winrock, who are implementing environmental and economic development programs under USAID's ASSET and PLUS projects. Also in the context of these projects, SECID/Auburn provides agribusiness technical assistance to private-sector businesses whose commercial activities support the achievement of USAID/Haiti objectives relating to agriculture and the environment, namely, increased farm income and conservation of Haiti's natural resources. Included in this group of organizations are Haitian mango exporters, domestic marketing firms, producers' cooperatives and ServiCoop, a marketing cooperative created by SECID/Auburn with USAID assistance in 1997.

Under SECID leadership and guidance, USAID contractors and grantees are increasing their use of marketing to achieve USAID goals relating to agriculture and the environment. Prior to SECID/Auburn involvement, USAID contractors focused their activities on changing farm production activities under an assumption that more efficient production would lead to increased farm income. An additional assumption was that farmers' long-term concern for the state of natural resources under their control, coupled with technical assistance on how to conserve those resources, would lead to farmer adoption of conservation farming practices. Project experience to date indicates that an extension focus on soil and water conservation technologies has not resulted in avid adoption of the technologies by non-participating farmers. An economic explanation for this phenomena is that, in the absence of marketing programs to maintain or increase the prices for the crops cultivated in association with the soil and water technologies, increased production tends to drive down prices, thereby discouraging other farmers from incurring the additional expense required to install the technologies. SECID has reversed this chain of cause and effect by focusing on marketing activities. For example, ServiCoop was created to increase competition in Haiti's cacao export market; this has resulted in farmers receiving a greater percentage of the export price of cacao. The increased price at the farm level has stimulated increased farmer interest in culturing cacao. Farmers are taking better care of their existing trees and planting new trees. SECID's mango marketing program promotes more direct links between existing exporters and farmers; this too has resulted in a higher farm-level price for the product. Once farmers began receiving higher prices for their mangos, they demonstrated an interest in increasing mango production by protecting their existing mango trees and planting additional trees. The increase in their income gives farmers an incentive to practice conservation and improve cultural practices related to those crops. Both of USAID's goals of increased farm income and enhanced natural resource conservation are met in a positive and sustainable way.

Another positive result of SECID's marketing programs is the strengthening of participating farm organizations. In the context of marketing activities, organizations receive training in accounting techniques and the roles and responsibilities of each member, as well as training in such subjects as proper harvesting and handling of the produce. The organizations and their members can apply what they have learned to other activities as they also develop the experience to function with less

supervision from SECID and partner organizations. This is another aspect of the sustainability promoted by SECID.

SECID's marketing approach is now becoming widely accepted by other USAID contractors, grantees, private sector firms and farmers. SECID would like to express its appreciation to USAID; CARE; PADF; ServiCoop; several mango export firms, especially Rainbow Agro-Industries, La Finca, Carribean Produce, and JMB Export; and to the many farm groups and individuals with whom we have worked. Our marketing program successes are due to the collaborative efforts of all these organizations and individuals. SECID is using its experience and the working relationships it has built to lead new initiatives and welcomes every opportunity to collaborate with other organizations and individuals to develop environmentally sound agricultural industries in Haiti.

CACAO YIELD IMPROVEMENT PROGRAM

Cacao gardens cultivated by small-scale farmers in Haiti are key components of productive ecological stability on the low-altitude hillsides where they are usually found, stabilizing the soil and attenuating rainwater runoff. In addition, they are grown in combination with larger shade trees. Improving the profitability of cacao increases farmer incomes and benefits the environment at the same time, because an increase in farm-level prices gives farmers an incentive to preserve and expand their gardens. They then become interested in learning about techniques for more efficient production.

Following SECID's market-oriented approach to economic development, stimulating an increase in farm-level prices is the precursor to any program concerned with production. SECID has achieved this increase in the farm-level price for cacao via ServiCoop. ServiCoop activities are covered in a separate section of this report. In the context of ServiCoop cacao marketing activities, however, cacao specialist B.K. Matlick visited Haiti and suggested that farmers could be educated in simple cultural practices that would increase the yield of their trees by 20-30%. USAID asked SECID to develop and implement a cacao yield improvement program (CYIP) based on B.K. Matlick's ideas. This program is being carried out via a partnership among SECID, CARE, and PADF. SECID has engaged a cacao production expert as consultant to provide technical assistance to PADF and CARE extension agronomists in efficient cacao production techniques. The CARE and PADF agronomists then extend the techniques to cacao farmers, supervise the plots used for demonstration purposes, and monitor their progress. CYIP's goal is to demonstrate to farmers how they can improve the efficiency of production within their existing cacao gardens; that is, how they can increase the yield of cacao from their existing gardens with a relatively small increase in investment. Improved prices and production translate into the higher profits that will encourage the farmers to continue to culture cacao.

The cacao production expert, Chris Stevenson, first visited Haiti at the end of last semester to choose demonstration plots. He traveled to cacao-producing areas in both the South, between Dame Marie and Jérémie, and the North. With the help of CARE and PADF agronomists, he chose 15

suitable gardens to be used as demonstration plots for better cacao production techniques. Most of the owners of these gardens are members of local cooperatives, and almost half of the owners are women.

From May 30 to June 19, Mr. Stevenson returned to supervise the main work in the demonstration gardens. He spent two days in each locality, teaching groups of extensionists and local farmers pruning and grafting techniques. The focus was on correct pruning of the cacao trees, grafting, and shade adjustment (thinning out the branches of overgrown shade trees to reduce shading from over 50% total shade to the desired range of 35%-50%); however, Mr. Stevenson also answered questions about the control of disease and pests. Those who participated in the work plan to apply the techniques they learned to their own gardens. Even more importantly, PADF and CARE agronomists understand the techniques and will be in the field to continue teaching more farmers.

In several areas, the farmers expressed an interest in planting new trees, or were already planning to do so. In the North, PADF will support collaboration between farmer groups in the various areas to make high-quality budwood and seeds available to all of them. PADF will work with the Cooperative Jean-Baptiste Chavannes, which owns the “Clonal Garden” in Grande Rivière du Nord, a large garden consisting of twenty-year-old trees from the Dominican Republic which may be cross-pollinated to produce excellent seeds for planting.

On his third visit, September 5-18, Mr. Stevenson visited the demonstration plots to observe their progress and to answer questions from PADF and CARE personnel. He also discussed the collection of information necessary to make a comparison between the production of the demonstration plots and that of the control plots. Personnel of PADF and CARE are to visit the demonstration plots regularly to record information about the harvests and to supervise follow-up work. Special measurements will be taken of high-producing trees in order to determine which are the best producers in terms of bean size and quantity. These trees will be marked as budwood donors. pH testing will also be done on the plots, since it has a noticeable effect on cacao production. To date, data collection activities have been slow to start and have not kept pace with program plans.

Mr. Stevenson plans to return in January, between the two harvest seasons, to continue the program. In the meantime, SECID is preparing a cacao production booklet in Creole, to be distributed to the program areas.

SECID prepared and distributed to USAID, PADF, CARE and other organizations a monograph entitled, *Cacao Yield Improvement Program: Interim Report*. The monograph is not part of SECID/Auburn's more formal series of PLUS Project reports.

SERVICOOP MARKETING ACTIVITIES

Cacao

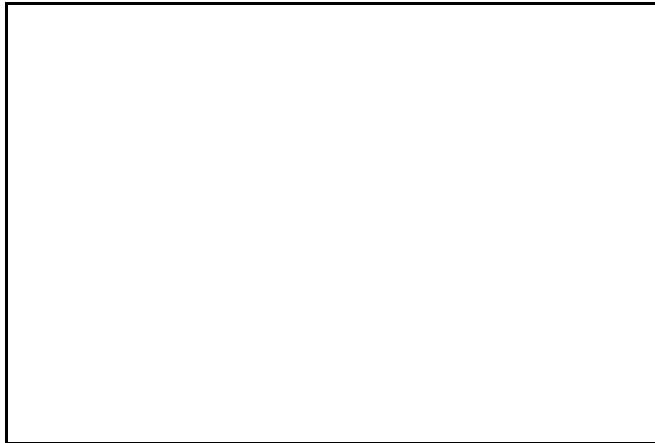
Two factors influenced ServiCoop cacao activities during this period: the continued fall in the international price of cacao and USAID's decision to assist ServiCoop install a buying station at Dame Marie in the Department of the Grande Anse, at the western tip of Haiti's southern peninsula. Although the fall in international prices had a negative effect on ServiCoop's profits, the negative effect was more than balanced by the positive impact of the Dame Marie purchasing center. In fact, the Dame Marie purchasing center has sustained ServiCoop throughout this semester. Without the center, ServiCoop would have been forced out of business.

The continued fall in the international price of cacao placed tremendous pressure on ServiCoop's profitability. While prices were approaching their 15-year low throughout this period, ServiCoop's policy was to hold prices up at the farm cooperative level as long as possible under the assumption that the downward trend in the international price would soon be reversed. A second reason ServiCoop wanted to hold prices up was to maintain a steady flow of cacao from the farm organizations/cooperatives in order to cover ServiCoop's overhead. ServiCoop's reasoning was that if its profits per pound were being reduced because of decreases in the international price of cacao while purchasing prices remained stable, then the only way to cover (pay) fixed overhead expenses was to sell larger volumes of cacao. ServiCoop's business manager Henry Bélizaire proposed that the way to increase the volume of cacao was for ServiCoop to open a purchasing station in the Grande Anse Department at Dame Marie, the center of cacao production in southwestern Haiti.

ServiCoop's Board of Directors discussed Mr. Bélizaire's proposal at its meeting on April 14, 1999 and decided to approve it. Mr. Felipe Manteiga of USAID was present at the meeting and indicated he would approve use of \$50,000 SECID/PLUS project funds under the condition that the funds would not be used directly as operating capital. TABLE 1 provides details on the use of these funds in establishing the buying center.

TABLE 1 USE OF USAID FUNDING IN ESTABLISHING SERVICOOP CACAO BUYING CENTER AT DAME MARIE	
Funding Use	Funding Amount
Buildings and Equipment	\$13,700
Truck, 3.5 mt Canter	\$17,450
Guarantee Deposit for Line of Credit for Operating Uses	\$15,000
Total	\$46,150

Once the proposal was approved, ServiCoop's business manager moved quickly to set up the purchasing center in order to purchase cacao from the southern region during the southern production season which normally runs from mid-April through November. The results have shown that ServiCoop's installation at Dame Marie was an excellent move for the business. From May through September, ServiCoop exported approximately 400 mt of cacao, most of which came from the new purchasing center at Dame Marie. Prior to the establishment of the purchasing center, during the 1998 season, ServiCoop received less than 100 sacks of cacao per week from the Grande Anse. Through the center this season (1999) ServiCoop received 300-500 sacks of cacao per week. Thus, it is quite clear that the establishment of the buying center at Dame Marie was an excellent move for ServiCoop.



Inauguration of ServiCoop buying center at Dame Marie

The establishment of the Dame Marie center was an excellent investment from the developmental point of view also. USAID invested approximately \$50,000 in the Dame Marie purchasing center for the purpose of increasing farm revenue from cacao. ServiCoop exported approximately 400 mt of cacao from Dame Marie with a value of approximately \$240,000 at the farm group level during the period of May-September, 1999. We estimate that ServiCoop's impact on the farm group level price of cacao results in an increase in value of approximately 20%. Thus, the increased revenue at the farm group level is estimated at approximately \$48,000. This magnitude of "return" implies a very high internal rate of return ($> 90\%$) for this investment. To better put the investment in perspective, we can lower the estimated increase in revenue and test what happens to the internal rate of return. If the investment resulted in farm incomes increasing by only \$10,000 (or 4% of the sales value of \$240,000) each year for a 10 year investment period, the internal rate of return would be approximately 20%. Thus, even in the absence of independently verified statistics, it seems reasonable to conclude that this was a very good investment of USAID development funds.

Coffee

ServiCoop exported three containers of coffee to French buyers participating in the fair trade network (Max Havelaar) of Europe. ServiCoop sold an additional three containers of coffee through this network for the year 1999-2000. ServiCoop began processing coffee from the cooperative COOPACVOD at Dondon. This coffee will form one of the three containers to be sold this year.

COFFEE MARKETING PROGRAM

This semester SECID enlarged its coffee marketing activities from a concentration on work with ServiCoop and began directly assisting farm groups. SECID activities in this domain include setting up a line of credit that provided short-term marketing loans to selected farm groups and a consultancy with Enterprise Works Worldwide (EWW) to review the farm groups current processing and marketing activities and recommend improvements.

Marketing Credit for Farm Groups

Working together, SECID and ServiCoop had developed new markets for coffee from farm cooperatives at Dondon (near Cape Haitian) and Thiotte (near the frontier with the Dominican Republic in southeastern Haiti). However, the cooperatives did not have cash to use in purchasing and processing coffee from their farmer members prior to payment by the international buyers. The international buyers were reluctant to advance marketing funds to the farm groups and ServiCoop did not have adequate working capital to do so. ServiCoop does final processing on the coffee and exports the coffee as the agent of the farm cooperatives.

To solve the financial problem, SECID negotiated an agreement with ServiCoop to control one of its lines of credit. SECID placed funds into ServiCoop's local bank which granted the line of credit. This deposit allowed an expansion of the line of credit. SECID then negotiated agreements with the cooperatives to which SECID would advance marketing funds. The agreements stipulated that the advanced funds, including interest charged by the bank, would be repaid with the proceeds from the sale of the coffee to the international buyers. By agreement with the farm cooperatives, the value of the marketing advances would not exceed 70% of the sales value of the coffee; thus, repayment was assured. Marketing fund agreements have been made with the cooperatives at Dondon and Thiotte. The agreements were based on a single container of coffee. The funding-marketing cycle proceeds as follows: the funds are advanced, the coffee is sold, the payment is received by ServiCoop and the cooperative, ServiCoop and SECID settle accounts. If there is a sales agreement for an additional container of coffee, the lending cycle can be repeated.

It is anticipated that the need on the part of these cooperatives for this program will end this coffee marketing year. The international buyers will be willing to advance marketing funds to the cooperatives next year. Other sources of funds will quite likely be arranged for coffee marketed to other markets. For example, SECID is advising some cooperatives to market their coffee to the *Haitian Bleu* marketing network, which advances marketing funds to participating farm groups. Based on experience this year, the farm cooperatives and ServiCoop may be able to arrange with the local bank to provide a line of credit using marketing contracts as the guarantee for marketing advances. In effect, this would replace the cash deposit made by SECID this year with a marketing contract. Thus, the short-term advance from SECID will have purchased the experience required for the cooperatives, ServiCoop and the bank to develop methods to accomplish the transaction without SECID.

Initial Consultancy with Enterprise Works Worldwide (EWW)

Based on its experiences with ServiCoop in coffee and cacao marketing, SECID was practically certain that it could assist coffee producers sell more coffee at better than traditional market prices if it could arrange for farm groups to prepare better quality coffee. To help confirm or strengthen this expectation and to generate specific recommendations for better marketing of coffee, SECID engaged EWW to conduct a survey of coffee marketing cooperatives (or groups) in areas of Haiti not currently participating in major coffee industry development programs such as USAID's *Haitian Bleu* marketing program.

The findings of the EWW consultancy have been published in SECID/PLUS Report No. 49, *Haiti Small-Scale Coffee Producers Production, Processing, Quality Control and Marketing*, by Gilberto Amaya, Victor E. Mencia, Patrice Gautier and Jose A. Gemeil. The EWW team noted many instances in which the Haitian coffee industry lags far behind those of Central America and Africa. Coffee farm yields are low in comparison to potentials. EWW noted that an improvement in farm management practices could help increase productivity on existing farms. They also noted that the ostensibly grim current situation could present Haiti with a great opportunity to target the fastest growing coffee market segments—organic and gourmet—which command high price premiums on the international market.

At the initial processing (village level) stage, poor techniques and equipment result in low yields from the wet processing process, the percentage of damaged beans is high, and because of intermixing of coffees from different altitudes and varieties, overall quality of the final product is poor. To help solve these problems, EWW made numerous recommendations among which were that the farm groups:

- be introduced to efficient and easy-to-handle processing equipment
- be trained on the use of the equipment
- be trained on modern, clean processing techniques
- be led to process more of their coffee conjointly so as to profit from economies of scale and standardize quality.

As a result of this initial reconnaissance, SECID has engaged EWW to implement a short-term project to implement some of their recommendations. This project will be implemented next semester.

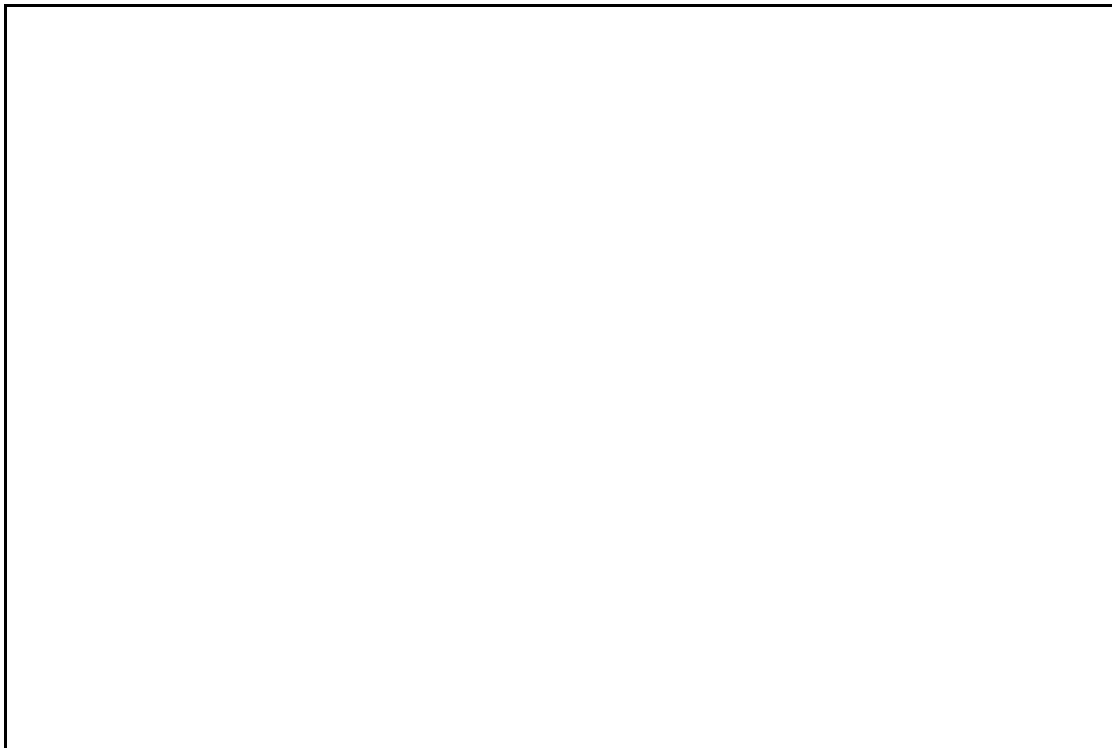
MANIOC MARKETING PROGRAM

Kasav, a flat-bread made from processed manioc, is a traditional part of the Haitian diet. SECID has shown that *kasav* can be made from dried manioc meal as well as from fresh manioc, and is promoting the development of a new industry based on this “discovery”. Since the dried product can be stored and transported more easily than the raw product, markets for it can be developed far from the farm. SECID Marketing Specialist Raymond Lerebours is stimulating the development of new

markets through the introduction of propane stoves used to cook *kasav*. At the same time, he is ensuring that the supply of manioc meal can meet the new demand.

This semester, total sales of processed manioc products averaged 6,433 pounds per month, up from last semester's 5,000 lbs/mo. Of this total, 5,100 lbs. was in the form of the manioc meal used in making *kasav*. The manioc meal is produced by farm groups in six regions of the country, two of which (Port-à-Piment and Mirebalais) are new producers this semester. The largest farm group, OPMAGAT, has also been using over 1400 pounds of processed manioc per month to make both *kasav* and candies which it sells locally. OPMAGAT is enjoying success with this side of its business, and will be visited during the next semester by other manioc-processing groups interested in expanding their capabilities.

Raymond Lerebours has been laying the groundwork for a larger market for the manioc meal. This semester he has held eight seminars, four in Port-au-Prince and four in more rural areas, to demonstrate the use of propane stoves to make *kasav* from reconstituted manioc meal. Ninety people participated in the seminars. Seminar participants who remain interested become eligible to receive a stove on a trial basis. So far, 15 stoves, with a value of approximately \$250 each, have been manufactured and distributed around the country. Each stove has the capacity to use 500 pounds of manioc meal per month and provide employment for two people. Currently, however, only 9 of the stoves are operational. These are providing a market for 1600 pounds of meal per month, or a little less than 200 pounds per stove. Several are functioning at less than full capacity due to an apparent lack of motivated workers. The remaining 6 stoves are scheduled for redistribution.



Propane-fired *kasav* stove

SECID has been developing a system for introduction of the new stoves that balances project concerns with market principles. The organizations and individuals who receive the stoves do not have enough working capital or credit to buy the stoves outright, especially considering the risk they would be taking with a new technology. Yet SECID expects that they will be able to make a profit from the sale of *kasav*, and so we expect to eventually recoup the cost of the stoves distributed. At first the stoves are lent on a trial basis. Their operations and profitability are evaluated after several months. Then, if the organization or individual is satisfied, they will sign a sales contract with SECID and together we will develop a method for payment of the stove by installments. Raymond Lerebours is also working with PRET, BUH, and BCA to develop a credit program which could assist both *kasav* producers (purchasing stoves) and the farm groups who process manioc (purchasing mills and other small machinery). The outcome of these credit investigations will be reported in the next semi-annual report.

Marketing Specialist Raymond Lerebours plans to work with the groups and individuals who have already received stoves in order to bring the amount of manioc meal they use up to at least 200 pounds per month per stove. Once this level has been established, he will distribute additional stoves to interested parties. Currently there are 14 zones around the country ready to receive stoves, and 3 zones ready to participate in the preliminary seminar on their use. If all 15 stoves now existing were to provide a market for 250 pounds of manioc meal per stove per month, and the consumption of manioc meal by larger buyers was to remain the same (at about 5,000 lbs/month), then there would be a market for 8750 pounds of manioc meal per month. Raymond Lerebours estimates that the farm groups now producing manioc meal have the capacity to produce 15,000 lbs/month. If they were to produce at top capacity, then SECID would be able to begin another facet of the manioc marketing program, a plan to package manioc flour for use in making *labouyi*, a type of Haitian porridge.

Up to this point, we have been describing the growth and development of this new industry. Now let's take a look at how it is accomplishing its underlying goal: increased income for small farmers. First of all, farmers marketing manioc to processing groups receive an average of 41 % higher prices for their crop than they would traditionally. This new marketing channel provides a valuable alternative to traditional marketing channels, where the manioc would usually be sold while still in the ground. Secondly, the groups almost double the value of the manioc through processing, and they also provide employment opportunities. At the other end of the marketing chain, the *kasav* stoves have been shown to be profitable by a study conducted jointly by PADF and SECID. In Grande Rivière du Nord, a stove tested during a three-month period was found to bring a net profit of almost 20% to the cooperative running the business there.

Also this semester, SECID tested a modification of the *kasav* stove which would allow it to run with kerosene. We had hoped that this modification would facilitate the use of the stove in rural areas where access to propane is difficult and unreliable. Unfortunately the kerosene stoves were not able to provide the requisite amount of heat, so we are continuing to promote only propane stoves.

MANGO MARKETING PROGRAM

Program Overview

Marketing Specialist Junior Paul is coordinating SECID's mango marketing program, focusing on organizing farm groups to market directly to Port-au-Prince exporters. SECID's approach, formulated last year and explained in the previous semi-annual report (1 October 1998 - 30 March 1999), was inspired by an examination of the traditional structure of the mango export industry. Traditionally, exporters and farmers had no direct contact with each other and all transactions were handled by intermediaries (*fournisseurs*). While it is naturally impossible for an exporter to talk with each farmer individually, it is feasible for an exporter to cut out the intermediary by negotiating with farm groups. For this reason, SECID has been strengthening the groups and bringing them into direct contact with exporters. The major results of the program are more effectual farm groups and consequently higher prices for the farmers. It is worth reviewing some of the other interconnected effects of this revolutionary change in the mango export industry as well:

- Farmers are demonstrating more interest in mango cultivation: planting and grafting trees. They no longer cut the trees to produce charcoal.
- Exporters are seeing farmers as partners.
- Exporters are leaving Port-au-Prince and visiting producer groups to negotiate prices.
- Exporters are building (sometimes in cooperation with farm groups) purchase centers in mango production zones where the fruit can be properly handled prior to shipment to Port-au-Prince.
- Exporters are recognizing that the traditional, *fournisseur*-dominated assembly system needs an overhaul.
- *Fournisseurs* are adapting their practices to remain competitive in the changing business environment.
- Farmers who are not direct beneficiaries of the program benefit indirectly from the higher prices stimulated by competition.

Mango Program Results: Increased Farmer Income

This is the third season SECID has implemented the mango marketing program. Each year the program has grown. We made our initial trial in 1997 with a group of some 500 farmers near Mirebalais. In 1998, we expanded the program to include 10 farm groups in 3 regions with approximately 1,600 farmers participating. This year, 1999, we have expanded the program to 20 farm groups located in four regions (Jacmel/Léogâne, Les Cayes, Mirebalais and Gros Morne) with approximately 5,000 farmers participating. These farm groups have sold a total of 133,700 dozen mangos, or about 7% of all mangos exported from Haiti this year.

Farm level price increases stimulated by the program have been substantial, ranging from 20% to 100%. The highest price changes have occurred in areas where traditional competition has been low. For example, we carried out our first program in Mirebalais which has not traditionally been a major supply area for export-quality mangos. There, farm-level prices increased more than 100% with the

introduction of our marketing program (prices increased from 3 Gdes per dozen to 8 Gdes per dozen). Last year in Gros Morne, a traditionally important production zone, prices increased more than 20% and in some cases by more than 50% (moving from 6 Gdes to 10 Gdes per dozen). This year in Gros Morne the season opened with prices at the farm level at approximately 12 Gdes, up approximately 20% from the previous season. The 20% (or higher) increase held through the season in Gros Morne and elsewhere. This year in Jacmel prices increased 50% (from 10 up to 15 Gdes per dozen) with the introduction of the program.

TABLE 2: MANGO MARKETING					
Geographic Zone	Name of Farm Group	Quantity of Mangos Marketed (dozens)	Price per Dozen Before Our Effort	Price per Dozen to Farm Group With Our Effort (Gourdes)	Farm Group Revenue With Our Effort (Gourdes)
GROS-MORNE					
Kamas	ADK	85,500	5	21	1,795,500
Myok	OPM	8,172	5	21	171,612
Dekosye	APD	9,720	5	21	204,120
Perou	OPP	10,234	5	21	214,914
APRM	Rivye mansel	6,828	5	21	143,388
APBR	Boukan Richa	186	5	21	3,906
Eneri	Fem solid	2,127	6	20	42,540
LEOGANE					
Bwaobe	CPMB	3,431	8	21	72,051
Duplesi	AGPGL	1,530	8	21	32,130
JACMEL					
Marigot	AKOLAD	921	10	20	18,420
Cayes Jacmel	Cheche lavi	2,160	10	20	43,200
MIREBALAIS					
Trianon	CEDA	277	6	20	5,540
Dosan	AGPP	163	6	20	3,260
Devarye	KOEPDA	1,027	3	21	21,567
Sodo	OPT	899	6	20	17,980
Sodo	Kotal	525	8	20	10,500
Total		133,700			2,800,628

There has been another result this year, difficult to quantify but nonetheless important. This result is a higher-quality mango, indicated by the fact that less than 15% of mangos from participating farm groups were rejected this season, compared to more than 30% last year. We attribute this to the education that farmers have received in harvesting and handling techniques. The end result is that farmers sell more of their mangos in the higher, export-quality price bracket, thus further increasing

their income.

It is difficult to estimate with accuracy the total value of our mango marketing program to farmers as a group due to lack of complete information on prices and volumes of mango marketed outside our program; however, it is informative to see what the total value might be under various assumptions. Let's assume that total exports during 1999 will be two million boxes with ten mangos in each box. To obtain this level of export, the industry would have to purchase 1.85 million dozen, assuming a reject ratio of 20% and the industry practice of purchasing 13 mangos per "dozen". If we assume that our mango marketing program resulted in a one-to-two-Gourde increase in farm-level prices for all 1.85 million dozen mangos, then the program should be credited with increasing farm revenue to mango farmers as a group by 1.85 to 3.70 million Gourdes or approximately US\$100,000 to US\$200,000.

If we express this "estimated" increase in farm revenue on a per capita farmer basis, the result is hardly impressive to people capable of reading this report. Assume that each farmer has ten mango trees producing 30 dozen each. Each farmer would sell 300 dozen and, because of the SECID marketing program, realize an extra 300 Gdes or US\$18. This information must be reconciled somehow with the fact that one group of farmers near Gros Morne voluntarily spent several days working with picks and hoes to repair a road so that trucks from the marketing program could reach their zone, allowing them to participate in the marketing program.

Mango Program Results: Institutional Strengthening

In addition to increased income for farmers, the mango marketing program is having a substantial impact on the institutional strength of participating farm organizations. Managing the assembly, field processing and shipment of hundreds of dozens of mango provides the farmer associations with valuable hands-on management and organizational experience. Since management skill is one of the most limiting factors of production and marketing in rural Haiti, the increases in management skill provided via the marketing program will no doubt have productivity impacts in other agricultural and civic endeavors. In addition, the roles and responsibilities of all association members are stressed in meetings. This is done to encourage all members to play an active, informed role in the association, so that the association does not simply generate income for a small group of officers.

Junior Paul and PADF personnel also train participating farmer associations in appropriate accounting procedures to account for the flow of mango and money into and out of the associations' hands. The associations put their knowledge to work almost immediately in their financial dealings with members and exporters. A typical association may buy mangos from the farmers at 12 Gourdes/dozen, spend 5 Gourdes on handling and management expenses, save 3 Gourdes for working capital and unforeseen expenses, and sell mangos to an exporter at 20 Gourdes. An association must also account for cash advances from exporters.

This year the necessity of careful record-keeping was dramatically demonstrated when on several

occasions the exporter and farmer association books showed differences in the quantities of mango delivered. In one case an exporter who had given a cash advance to one association believed that the association owed him more than 40,000 Gourdes. The association had records, signed by the exporter's employees, showing that a much greater quantity of mangos had been provided to the exporter. A meeting between representatives of the association, the exporter, and Junior Paul concluded with the association receiving an additional 8,000 Gourdes due as payment for the mangos delivered.

As the associations move from theory to practice, they need guidance and support. SECID Marketing Specialist Junior Paul and PADF personnel provide this support. To keep up with the increase in work load brought about by growth of the program, this year eight Marketing Supervisors were hired on a short-term basis and trained by Junior Paul to assist the farmer groups. They assist the groups in managing the marketing activities and encourage members of the associations to play an active role in the management of the activity. In preparation for this season's marketing activity, Marketing Supervisors helped the associations conduct surveys of farmers in their areas to invite them to become members of the association and to estimate quantities of mango available for harvest. As the groups become more experienced and confident, they do more by themselves. Eventually, they will be able to function on their own.

In the region of Gros Morne, the farmer associations were so motivated by the success of the mango marketing program that they decided to form a federation of cooperatives and requested assistance from SECID. After discussions with the Haitian Government Conseil National des Coopératives (CNC), PADF and CARE, it was decided that CARE would provide training in cooperative principles in association with SECID. A "training of trainers" is planned for October, to provide 30 local trainers with the skills to educate association members in each of the 6 localities where the marketing program is active.

The training provided to association members in proper harvest and post-harvest handling of mango as well as accounting has resulted in a decreased percentage of rejected mangos, and has increased farmer understanding of the export business. As farmers and exporters begin to have direct contact with each other, they build a degree of mutual understanding and trust that did not exist before. They are developing a partnership.

SECID developed a monograph entitled *Mango Marketing Program: Interim Report*. The monograph was distributed to USAID, CARE, PADF and other organizations in Haiti. It is not a part of SECID/Auburn's more formal series of PLUS Project reports.

MARKETING PROGRAMS FOR OTHER EXPORTABLE CROPS

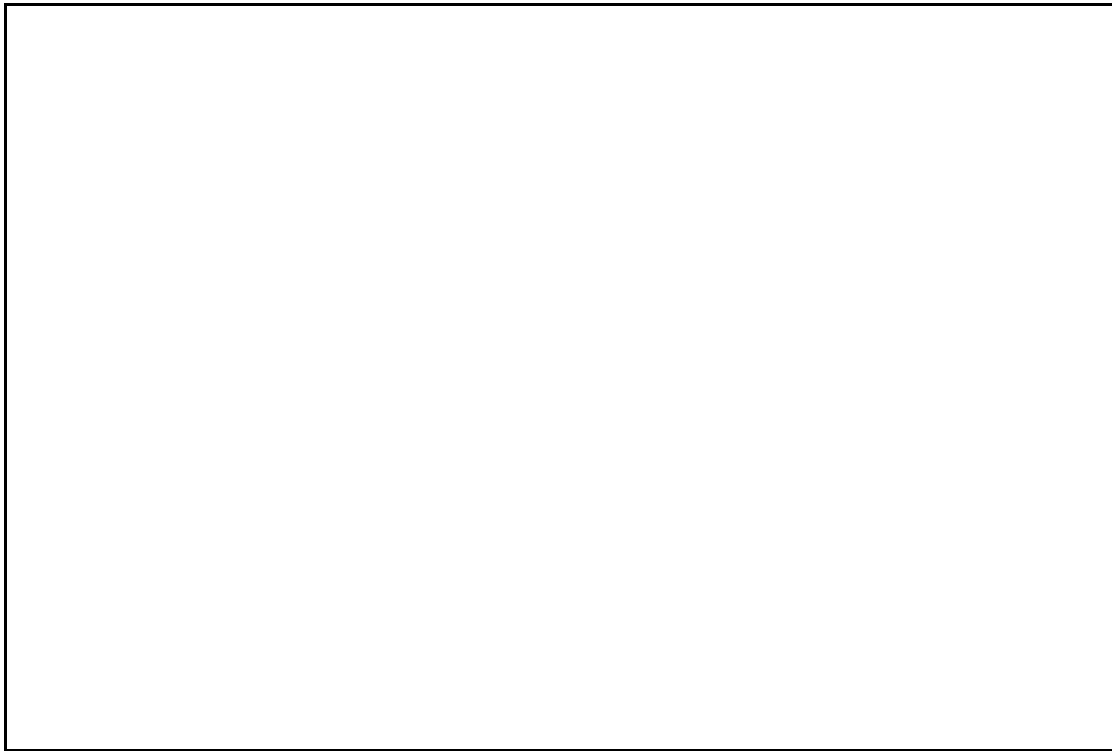
Program Overview

Encouraged by the development of working relationships between SECID and various mango exporters as a result of SECID's mango marketing program, SECID Marketing Specialist Junior Paul asked various mango exporters if they would be interested in developing marketing channels for other crops. The exporters responded by requesting SECID's assistance with export trials of such crops as: hot pepper, pumpkin, pigeon pea, igname (*Dioscorea* spp. in Latin and *yam* in English) and malanga (*Colocasia esculenta* in Latin and *dasheen* in English). Last semester, SECID began marketing programs for igname, malanga, pigeon pea (*pois congo*), and sour orange. These programs are covered in individual subsections of this report. This semester, as a result of further requests from exporters, SECID has added marketing programs for breadfruit, kenep, pumpkin, and hot pepper. We try to concentrate more on crops which are beneficial to the environment and do not contribute to erosion; often these are tree crops or crops which are grown in association with trees (such as yam). We are trying to focus our assistance related to non-tree crops on farmers who participate in tree crops programs. However, our top priority remains increased income for small farmers.

All of these marketing programs are still in the first stages of development. With hot pepper, for example, we have agreements with exporters and producers, but the product has not yet reached the trial shipment stage. With other products, trial shipments have taken place but are not ongoing due to harvest times, logistical difficulties, or lessened exporter interest. In the development of a typical marketing program, SECID first identifies an exporter willing to commit to a trial export shipment of the crop. Then Marketing Specialists Junior Paul and Raymond Lerebours collaborate with NGOs (such as PADF or CARE) to identify farm groups who want to participate in the trial. Together, these parties conduct a survey of existing production capacity and crop prices. According to the survey findings, SECID negotiates an agreement on price and quantity of the product with one or more exporters. We aim for a price substantially above that of the local market price, so that not only will the farmers benefit from a higher price, but the farm groups will also be compensated for their role in assembling and field treating the product, and there will be a margin for handling rejects (the non-export-quality portion of the farmers' crop). SECID, CARE, and PADF may provide funding for the purchase and distribution of germplasm in order to reach the desired quantity and quality of the crop. As with the mango marketing program, SECID provides training in appropriate handling and assembly techniques and in accounting and management to support the farm groups. Finally the time arrives for harvest of the crop and a trial export shipment. The SECID Marketing Specialists and collaborating personnel of other NGOs are present to help coordinate the activity. If all goes well, plans are made for further shipments. With each shipment, SECID involvement begins to diminish. Coordination of follow-up shipments is increasingly assumed by the exporter, the cooperating NGO and the farm group.

Program Activities and Results Relating to Breadfruit

SECID first began investigating marketing possibilities for breadfruit back in 1995, but because the fruit is highly perishable and not a traditional export crop, the investigations involved its transformation into chips or flour for domestic use. These breadfruit experiments were not as successful as those which produced manioc flour; however, SECID retained the hope of finding a good market for the crop. Breadfruit is plentiful in Haiti, and often goes to waste for lack of an acceptable market. At the beginning of 1999, breadfruit was on a list of products with potential for development that was shared with exporters. At the end of March, Mr. Raphael Larrea, the director of Rainbow Agro Industries, asked our assistance in locating breadfruit for export to Miami and New York. We contacted representatives of PADF and other organizations in order to identify in what areas the product was available at that time of year. The first contact, with ATPAF near Camp Perrin, resulted in a successful trial shipment from Torbeck on April 27. The participating farmer organization received 10 Gourdes/dozen, compared to a going rate of 6 Gdes/doz on the local market, and sold 91 dozen. Because the breadfruit was of good quality and the international price was high, Mr. Larrea agreed to offer 25 Gdes/doz for future shipments. He made two more trials from Marigot and Cap Rouge, near Jacmel, while Mr. José Sylvain of La Finca offered the same



Marketing Specialist Junior Paul (center) with breadfruit assembled in Marigot for a trial shipment

price in one trial in Léogâne. The results are summed up in the table on the next page.

TABLE 3: BREADFRUIT MARKETING					
	Locality	Organization	Quantity (doz)	Price (Gdes/doz)	Total Price (Gdes)
	Torbeck	ATPAF	91	10	910
	Marigot	AKOLAD	650	25	16,250
	Cap Rouge	APKK	200	25	5,000
	Léogâne	CPMB	48	25	1,200
Total			989		23,360

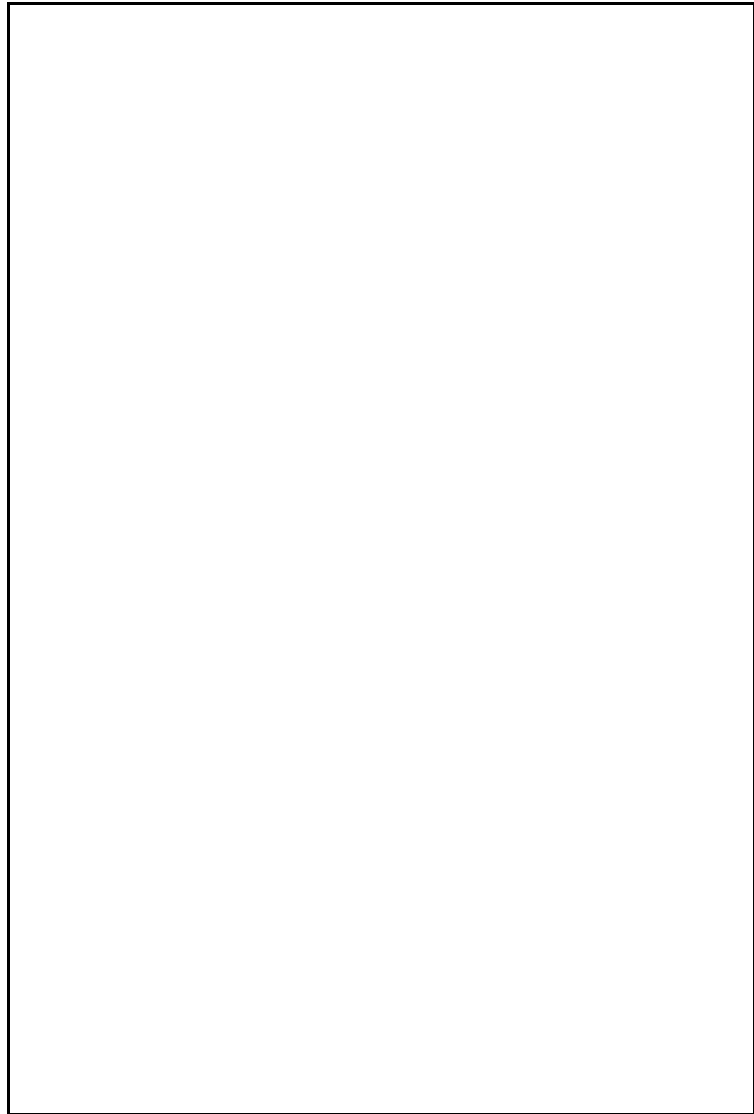
The farmers, who used to feed excess breadfruit to their pigs, were amazed to find that it could be so valuable to them. They are extremely enthusiastic about the program. The exporters, on the other hand, have experienced problems with transporting the breadfruit from rural areas. Conditions in Haiti make it almost impossible to guarantee that the breadfruit will arrive in Port-au-Prince (for shipment by air) on the same day that it is harvested. Because of the fruit's extreme perishability, it will spoil if not exported almost immediately. SECID is attempting to overcome this problem by focusing on trials in the areas closest to Port-au-Prince. Exporters Larrea, Sylvain, and Germain Paul are all interested in future trial shipments.

Program Activities and Results Relating to Pumpkin

The pumpkin marketing program began in January when SECID asked Mr. Raphael Larrea and Mr. Lucien Rousseau of Rainbow Agro-Industries if they would be interested in exporting local pumpkin or participating in a program to produce foreign varieties of pumpkin. Mr. Rousseau suggested that we begin with marketing of the local variety, which is valued for its taste. In May, Mr. Larrea contacted us for assistance in collecting 30,000 lbs of pumpkin for a trial shipment. We met with organizations around the country to try to find this quantity. So far, four farmer groups, comprising over 150 farmers in two regions (Jacmel and Camp Perrin), have participated in the program, selling 21,066 lbs of pumpkin. The margin between the international price for pumpkin and the local price was not as high as it is for most of the other crops we work with, so at first Mr. Larrea was reluctant to offer more than 1 Gde/lb, which is just 0.25-0.50 Gdes/lb over the local market price. At this price, our Marketing Specialists felt that it would be difficult to gather a significant quantity of pumpkin, so Mr. Larrea agreed to offer 2 Gdes/lb to initiate the program. The farmers were satisfied. One farm group is prepared to sign a production contract with Mr. Larrea, and we are planning to expand the program as the main harvest season occurs towards the end of this year and the beginning of 2000.

Program Activities and Results Relating to Kenep

Kenep is a common fruit in Haiti, but it has traditionally been exported only in very small quantities. During the last two years, certain exporters have made trial shipments to the North American market. These did not meet with great success, due partially to the perishability of the product and partially to the method of its collection (through intermediaries), which did not allow a price premium to reach the farmers. Last year, farmers in various regions of the country asked SECID to develop a marketing program for kenep. As the next step, several farmer associations conducted surveys which showed that there was a large quantity of kenep available for the export market. SECID then contacted exporters to determine their interest in negotiating terms and price. Both Mr. José Sylvain and Mr. Raphael Larrea were interested in buying kenep, but Mr. Larrea offered 30 Gourdes for a case weighing 30 lbs, whereas Mr. Sylvain offered only 15 Gdes. The average price on the local market was 12 Gdes. Two organizations in Léogâne participated in the program and sold 566 cases to Mr. Larrea in September. The trial was a success, but it could not be repeated because the harvest season was ending. Marketing Specialist Junior Paul plans to extend the kenep marketing program to other regions of the country in the coming year. The harvest season will begin in July.



Packaging kenep, Léogâne

Program Activities and Results Relating to Hot Pepper

This marketing program began in July with the preliminary identification of regions able to produce worthwhile quantities of hot pepper (*piment*) variety Scotch Bonnet. SECID Marketing Specialist Raymond Lerebours is leading the program. He reached agreements for production with representatives of the organizations ATPAF (Camp Perrin), ORE (also Camp Perrin), CEHPAPE (Petit Goâve), and PADF (in Camp Perrin and Mirebalais). Then he negotiated with interested exporters. SECID has signed a production contract with Mr. Raphael Larrea (of Rainbow Agro Industries) for 3,000 lbs per week and a contract with Mme. Nancy Mourra Fombrun (of Agropack) for 7,000 lbs/wk. On the local market, hot pepper is sold by marmite. Assuming that there are 2 lbs of hot pepper in one marmite, and with an exchange rate of 16.5 Gourdes to the US dollar, the local price can reach as high as \$1.80/lb. In season, however, the hot pepper sells for just \$0.25/lb. This compares to the \$0.40/lb agreed upon by both exporters. Export-quality hot pepper is not readily available in Haiti, so SECID provided 5 lb of the seed for planting. Raymond Lerebours distributed this seed in September, but because of heavy rains it could not be planted immediately. Once planted, the hot pepper will take 4 to 5 months to reach maturity. Therefore, the first trial shipments should take place towards the end of the next semester.

Program Activities and Results Relating to Dried Immature Sour Orange

The sour orange tree usually drops a substantial proportion of the fruit it has set while the fruit is still quite small. The dropped oranges may be collected, sun-dried, and sold on the export market to provide farmers with some additional income. Last semester, SECID's Marketing Specialists encouraged farm groups to collect the dried sour oranges for sale to ServiCoop, which had a sales contract for the product with a Spanish buyer. Between March and June of this year, approximately 2500 lb (500 marmites) of the product was sold to ServiCoop, which was able to ship a 20' container to its buyer. The farm groups, in Gros Morne, Mirebalais, and Jacmel, received 20 Gdes/marmite for the dried immature sour oranges. ServiCoop found that it took too long to collect a sufficient quantity of the product for shipping, so it is not interested in continuing to purchase the product. SECID Marketing Specialist Junior Paul will find other Haitian buyers during the coming semester.

Program Activities and Results Relating to Igname

As reported last semester, there were unresolved problems with the quality of the igname purchased by exporters from farm groups. There have been no further shipments this semester. However, Mr. Wilhelm Reimers has expressed an interest in shipping a container of igname, and SECID is also in contact with exporter Mme. Nancy Mourra Fombrun. By the end of October, SECID plans to have collected information on the quantity of igname available and the time it is expected to be harvested. Agronome Rico Nicholas of PADF will be responsible for collecting this information in the region of Jacmel, and Raymond Lerebours will be responsible for the Grande Anse. SECID also hopes to collaborate with CARE.

Program Activities and Results Relating to Malanga

The malanga distributed by CARE and PADF last semester will be ready for harvest next semester. SECID will report on planned export trial shipments in the next report.

MONITORING AND EVALUATION ACTIVITIES

SECID/Auburn Monitoring and Evaluation (M&E) this semester focused on activities with the USAID's ASSET and Hurricane Georges Reconstruction Projects.

ASSET Project

SECID implemented a baseline study of household economic conditions and agricultural practices of farmers participating in ASSET Project activities. The study was completed by September 30, 1999 and a draft report was submitted to ASSET Project officials. The final report has not been published pending clarification of one of the findings of the report. The clarification centers on responses farmers made relating to their use of rock walls as soil conservation barriers. Some 60% of farmers indicated that they use rock walls, yet ASSET Project staff see very little indication of rock walls used as a soil conservation technique in the ASSET Project zones. SECID recommended that a random sample of the farmers indicating rock wall use be visited by SECID and ASSET staff to better understand the situation. This rapid appraisal activity will take place next semester.

Hurricane Georges Reconstruction Project (HGRP)

USAID awarded SECID a two-year, \$449,993 contract to assist USAID design and implement a monitoring and evaluation program for the HGRP. The contract was signed September 20, 1999. We expect that implementation will get underway next semester. SECID continued throughout the semester to provide consultation to USAID on HGRP design. This is consistent with SECID's approach to M&E. SECID views M&E as a process designed to help clients (such as USAID) achieve superior performance in project implementation.

SECID's approach to M&E is based on the proposition that "you get what you measure." From a practical point of view, this means that M&E indicators become focused goals for implementing contractors. If the contractors understand, first of all, what is being measured, and secondly, that systems are in place to actually take the measurements, they will focus their efforts to generate achievements that will deliver measures of the expected results. Thus, some of the most important work of a M&E activity takes place before implementation starts, when activity objectives and goals are studied and refined into performance indicators and measurement systems are designed. This exercise focuses the attention of both the funding agency and the implementor on desired results and stimulates effective planning and implementation.

An example from the HGRP may help to illustrate these points. One objective of the HGRP is to develop local disaster preparedness in communities in order to prepare for and respond to future natural disasters such as hurricanes. HGRP implementors are being asked to assist communities form disaster preparedness committees. “Forming an effective disaster preparedness committee” is a broad goal that does not define how achievement will be determined. Thus, a great amount of “room” is left for interpretation and disagreement between funding agency and implementor relative to successful achievement of the objective. However, if the funding agency’s M&E plan indicates that members of the committees and the general public will be interviewed to determine their knowledge of committee officials’ names, meeting times and preparedness plans, the project implementor will direct efforts toward activities that will achieve results that will be observed through measurement of performance indicators in these specific areas.

For example, if the implementor knows that the community population will be surveyed to determine if they know the names of the officers of the disaster preparedness committee, the implementor will make concerted efforts to inform the population of these details. This information should stimulate the community’s interest in the disaster preparedness committee and lead to greater participation in the committee’s activities and a better prepared community. If the performance indicators are well defined, the implementor’s efforts should be well focused and the goals and objectives of the project will be achieved and documented. If interim measurements of performance indicate inadequate progress toward achievement, the funding agency can assist the implementor modify program activities to bring progress back on track.

The finalization of performance indicators continued throughout this semester; thus, the finalized indicators cannot be reported here. However, we can report that our efforts were focused on defining performance indicators relative to:

- C The change in household income of beneficiaries, defined as gross income rather than net income, with the target being full recovery to pre-hurricane levels.
- C The resiliency of communities to future natural disasters, focusing on the development of functioning disaster preparedness committees, household level disaster mitigation and preparedness, and the reduction of soil erosion and rainwater runoff from farm lands.

In addition to consultation on performance indicator development, SECID also provided a technical reconnaissance by SECID/Auburn soil experts of some of the areas targeted for assistance. Their findings are described in SECID/Auburn PLUS Report No. 47, *Technical Assessment of the Irrigation Systems of Marigot and Jacmel and Preliminary Observations on the Marigot Watershed*, Kyung H. Yoo and Dennis Shannon. The executive summary of that report is duplicated here in the **APPENDIX**.

PROGRAM ADMINISTRATION

PLUS Project Contract Extension

Upon request from USAID, SECID/Auburn developed a budget and plan of work for a one-year extension of the SECID/PLUS contract. In August, 1999, USAID accepted the proposal and through an amendment to the SECID/PLUS contract extended the contract completion date to December 31, 2000 and added \$1,056,605 to the contract funding level.

Personnel

SECID renewed short-term contracts with eight marketing agents who have been assisting SECID Marketing Specialists, Junior Paul and Raymond Lerebours implement marketing activities with farm groups. The marketing agents assist farm groups run surveys among their members to determine marketable quantities of desired products and assist the groups assemble crops for sale to buyers. SECID also renewed its contract with Sarah K. Belfort, SECID/Auburn Program Assistant.

APPENDIX

EXECUTIVE SUMMARY FROM

**Technical Assessment of the Irrigation Systems of Marigot
and Jacmel and Preliminary Observations
on the Marigot Watershed**

by

Kyung H. Yoo and Dennis A. Shannon

**SECID/Auburn PLUS Report No. 47
USAID/Haiti Agriculture and Economic Growth Office**

EXECUTIVE SUMMARY

An irrigation system located near Marigot was damaged by flooding from Hurricane Georges. A water engineer and an agronomist were asked to determine what was needed to rehabilitate the system and to protect the system from damage from future storms. The site of a second irrigation system, planned for Jacmel, was also visited and recommendations made.

Irrigation Systems

The Marigot system has two components, one with intake at Rodaille, serving 360 ha on the east side of the Plantil River, and one with intake at Belle Roche serving the 165 ha on the west side. The canals at the field level were in good condition, although water management within individual fields appeared inefficient. The intake structures at Rodaille and Belle Roche were severely damaged. A syphon crossing under the river from the intake at Rodaille was destroyed. The east bank of the river was eroded several meters inland at this point and the course of the river was displaced eastward. Without protection, this bank will continue to erode eastward, with the loss of cropland and sections of the primary canal. A closed conduit crossing the dry riverbed appeared to be intact but was filled with rock and debris. A portion of the primary canal running along the west bank of the river from the Belle Roche intake was destroyed when the riverbank collapsed as a result of the flooding.

Because of the destruction to the upper portion of the Rodaille system, irrigators on the westside secondary canal constructed their own diversion, running water into the secondary canal and at one point passing water under the secondary canal. If this situation is allowed to persist, the system will be irreversibly damaged.

Recommendations:

- < Relocate the intake for the Rodaille system upstream from the present site and on the east bank of the river, to avoid the need for a syphon.
- < Build a new upper canal section to connect up to the existing primary canal.
- < Install conservation structures to protect the primary canal from further erosion of the east bank of the river.
- < Divert the stream channel westward within the riverbed.
- < Clean the enclosed conduit and the canal between the syphon and the conduit
- < Relocate the Belle Roche intake and the main canal.

The Jacmel system will require 17 km of main conveyance canal and will serve approximately 500 hectares, of which 300 ha will be in the lowland and 200 ha on hillsides. The most difficult part of the system will be the construction of the upper section of the canal along the steep river bank next to the proposed intake. The site proposed for the intake appears to be adequate. The greatest hazard to the system will be the potential for increased soil erosion on the steep slopes due to the added water.

Recommendations:

- < Provide training in soil and water conservation along with installation of the system at Jacmel
- < Install conservation structures such as bench terraces on irrigated hillsides.
- < Implement programs for irrigation system maintenance and water use management at Jacmel and at Marigot in order to ensure efficient water use and system longevity.
- < Train system operators and users in system maintenance and water use management

Marigot Watershed

Evidence from the deposition of large rocks on farmland and widening of streambeds suggest that the flooding that occurred with Hurricane Georges was unprecedented. It appears unlikely that the extent of damage could be attributed to conditions in the foothills. These are fairly well vegetated to the northwest, although the foothills to the northeast, draining into the intermittent stream, have more extensive clearing and erosion.

The Marigot watershed drains a 12-15 km length along the south slope of the La Selle chain of mountains, which surpasses 2000 m in elevation. The Rivière Blanche and Plantil Rivers drain the western part of the watershed, while the eastern side is drained by intermittent streams originating in the high plateau that forms the buffer zone to Parc La Visite. Although the high peaks are forested, a vast area below this is almost devoid of trees. Some areas are intensively cropped with vegetables, but large areas have been used as pasture and the vegetation closely grazed. Soil and water conservation measures are virtually non-existent. Gullies and rill erosion are common.

Recommendations:

Soil and water conservation measures in the upper part of the watershed are required on a large scale in order to reduce the flooding hazard to the irrigation system at Marigot. These include:

- < ravine stabilization measures
- < establishment of woodlots and natural vegetation, contour plantings of trees and grasses
- < introduction of soil and water conservation practices into improved crop production (rock walls, contour hedgerows, alley cropping and other agroforestry practices)
- < improved soil fertility management
- < greater emphasis on perennial crops
- < improved livestock husbandry and pasture management.
- < In the long term, a solution must be found to limit the free grazing of livestock that prevents the establishment of adequate ground cover.

